SOFIA hangar transformation underway at Ames

Hangar N-211, built in 1946 and home to just about every aircraft with which Ames has been associated since, is entering a vibrant new phase. Soon it will house the largest airborne astronomical observatory in the world, the Stratospheric Observatory for Infrared Astronomy, or SOFIA.

This Ames-based observatory, jointly sponsored by NASA and the German Aerospace Center, or DLR, features an infrared telescope built into a modified Boeing 747SP. Flying at up to 45,000 feet, above 99 percent of the water vapor in the Earth's atmosphere, it will enable scientific observations that are impossible for even the largest and highest of Earth-based telescopes. Science operations are expected to begin at the end of 2002.

SOFIA requires a ground base featuring an aircraft support system in addition to the same kind of science-related infrastructure that typically supports terrestrial telescopes, and N-211 is being reconfigured to meet those needs.

"Once operations begin, the hangar will house over 100 scientists, operations and maintenance team members, and support staff," explains Ames on-site manager Ed Austin, who is with SOFIA's prime contractor, Maryland-based Universities Space Research Association. "When you look at that huge hangar and the large plane inside it, you'll see a place where exciting research is being conducted, a center of knowledge about infrared astronomy."

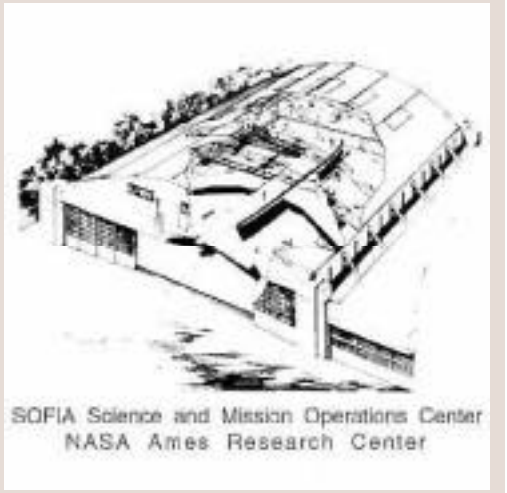
By co-locating a wide variety of support features into a single location, SOFIA can meet its ambitious flight and data generation rate at a relatively low cost, as is needed to achieve the high productivity being sought for this world-class, highly visible observatory.

Two of the easiest-to-spot hangar modifications include work on a new roof, replacing the original with a polyvinyl chloride (PVC) membrane roof, and a new roll-up tail door, needed to accommodate the 747SP's tall vertical stabilizer. The main hangar doors are approximately 40 feet high, and that height will now increase to about 68 feet at its center with the new tail door.

The previous, smaller tail door, operating on a track, was created to accommodate the Constitution, a double-deck, Lockheed-built troop and cargo transport plane housed at Ames from 1949 to 1950.

N-211 will become the SOFIA Science and Mission Operations Center, being built from the ground up inside the hangar. Components include:

Preflight integration facility – This includes a Telescope Assembly Alignment Simulator, featuring simulation hardware for principal investigators to complete mechanical fit checks, optics alignment and bore sighting, among other functions, prior to mounting their instruments to the SOFIA telescope. Included as well is the two-story System Integration Lab, featuring hardware and software to aid in the functional integration of science instruments, to practice mission scenarios and to simulate flight operations.



SOFIA Science and Mission Operations Center
NASA Ames Research Center

Mirror coating facility – One to two times per year, the SOFIA telescope mirrors will be taken out of the plane and placed in this facility for re-coating. Included is a mirror stripping room and a vacuum chamber specially constructed for mirror re-coating.

Science instrument labs – There are 10 initial instruments under development to fly on SOFIA, each being built at a different university or lab in the U.S. and Germany. When principal investigators arrive at the Science and Mission Operations Center with their instruments, they will have at their disposal individual labs to continue working on their instruments in preparation for observing missions. Several of these instruments will be kept in the hangar on a permanent basis and run by the observatory staff for the science community at large.

Data center – Plans are being developed for a sophisticated data archiving system which will eventually make all of the findings from SOFIA observations easily accessible to the science community.

United Airlines, subcontracted to the Universities Space Research Association to handle the plane's maintenance and operations, will build and staff a dedicated SOFIA service capability within N-211 for day-to-day servicing and maintenance of the 747SP. This will complement United's capabilities at the San Francisco and Oakland airports, where major maintenance on SOFIA will be performed periodically.

Also under construction is a new elevator for the handicapped and for transporting instruments, along with a second-floor ramp leading from the integration facility right into the plane's main cabin, designed for easy movement of personnel and instruments. In addition, a tank to hold about 11,000 gallons of liquid nitrogen—needed to cool both the telescope and the cavity in which it is housed before each flight—is soon to be installed.

A unique aspect of SOFIA is the integration of Education and Public Outreach (EPO) into the layout of the observatory and hangar. The plane's first-class section is being converted into seating for up to 10 visitors, so that flights can include educators from schools, colleges, universities and science and technology museums. The hangar will feature an EPO area, including a classroom for pre-flight educator training.

Most of the work in N-211 is set for completion in January 2001, with move-in starting next April. The SOFIA plane is scheduled to arrive in the fall of 2002, following current reconfiguration at subcontractor Raytheon's facilities in Waco, Texas, and integration of the telescope in Germany.

Further details about SOFIA are available at http://sofia.arc.nasa.gov and at United Airlines' SOFIA site, http://www.ual-sofia.com.

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